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Combined 1st & 2nd Quarterly Circulars for 1958

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Rubber Research Institute of Ceylon

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Those who wish to visit the Institute are requested to do so after making an appointment. No special days are set apart as Visitors' Days and the services of the technical officers can be availed of for discussion or demonstration only by prior appointment.

PUBLICATIONS

Rubber Research Institute publications comprising Annual Reports, Quarterly Circulars and occasional Bulletins and Advisory Circulars are available without charge to the Proprietors (resident in Ceylon), Superintendents and Local Agents of rubber estates in Ceylon over 30 acres in extent. Advisory Circulars and Smallholdings Leaflets in English or Sinhalese will be available without charge to Smallholders on application. Forms of application can be supplied on request.

It will be appreciated if subscribers will return any back publications which are of no use to them.

ADVISORY CIRCULARS

The undernoted Circulars may be obtained on application at 30 cents per copy. Future issues in the series will be sent free of charge to estates and smallholders registered for the receipt of our publications:—

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SOIL CONSERVATION, DRAINAGE AND HOLING

By

C. A. de Silva

The conservation of soil by collecting the surface run-off and removing this water from the land in the correct way is a primary necessity in new planting and replanting of any cultivated land. The excess run-off water consists of that part of the rainfall which is not absorbed by the soil. It is this run-off water which is responsible for the more serious soil erosion on steep and undulating land and for the complete or partial removal of surface soil and organic matter. The latter is a most important constituent of soil for its tilth and water-holding capacity.

There is little doubt that the good growth of rubber is substantially dependent on the effectiveness of the soil conservation methods that are adopted.

It would not be out of place here to refer to the early establishment of cover crops. In a clearing which has been felled, burned, and cleared it is essential to establish a leguminous ground cover before earth works are undertaken. In the South-West monsoon zone regular showers are experienced in March, which permit the introduction of ground covers. The absence of such ground covers will result in a considerable loss of surface soil, which cannot be regenerated in many years of systematic cultivation. Pueraria phaseoloides and Desmodium ovalifolium are the two more commonly used ground covers. Stylosanthes gracilis, which has been introduced in recent years, is less satisfactory but suffers least from long periods of drought.

Contour belts of erect covers between the rows of rubber, such as Crotalarias, Flemingia congesta and, on heavily eroded soil, *Tripsacum laxum* (Guatemala grass) will be most useful against heavy erosion in the early years of a rubber clearing.

Further information on cover crops will be found in Advisory Circular No. 56.

General Earth works.

We have in the past recommended the construction of contour platforms, contour trenches, and silt pitted drains as means of preventing soil erosion. With the present cost of labour, heavy earthworks like contour platforms and trenches are clearly uneconomical.

In an experiment at Dartonfield Estate for comparing the growth of budded rubber under three methods of opening the land, the following growth figures were obtained 7 years from planting:—

1936 Replanting Experiment, Dartonfield Estate

Mean Girth in Inches

Contour Platforms	*Contour Trenches*	*Silt Pitted Drains*
21.7	20.8	20.6

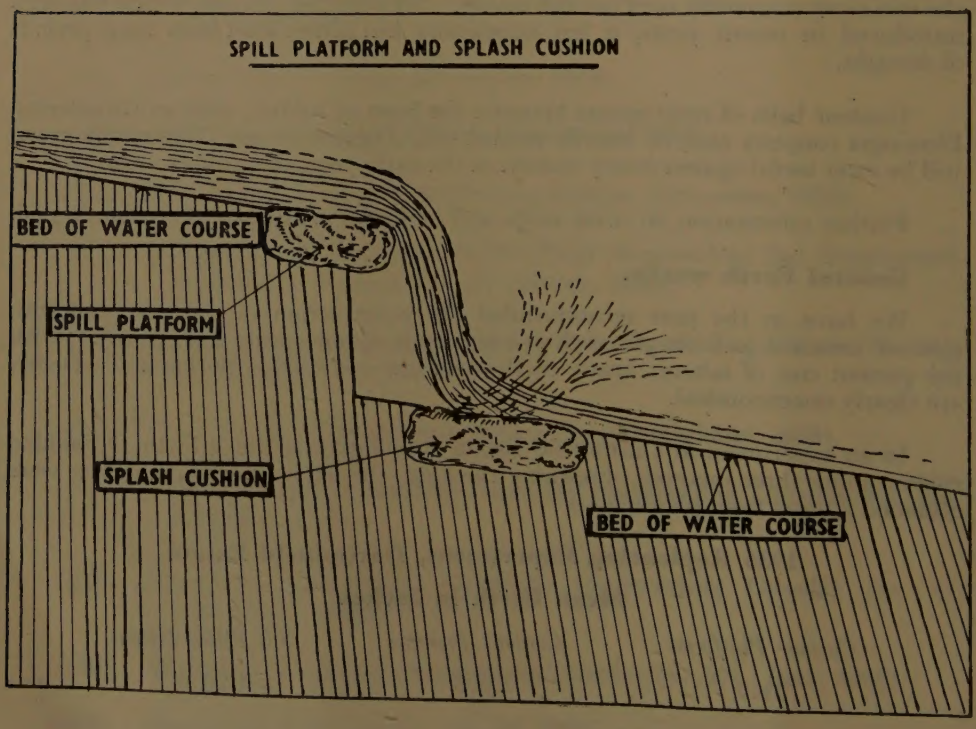
The differences in girth in the three methods are not of any practical significance. The cost of cutting platforms is about twice that of silt-pitted drains, and contour trenches cost about 1½ times as much as the latter. These methods of opening are not recommended at the present time.

When satisfactory creeping and erect covers have been established, the construction of silt-pitted drains or contour stone terraces on rocky land will be adequate for the prevention of serious soil erosion.

Main Drains.—(Nethi-kanu). The special construction of leader or main drains should be avoided, and natural drain lines already indicated on the land should be used except in cases where the distance between two natural drains becomes excessive, for example more than about 200 feet. On sloping land the correct siting of these leader or main drains is more important than the distance between them. This is more a problem in new planting than in replanting schemes, as most areas to be replanted have the main drains clearly developed over many years of cultivation.

The natural leader drains can be improved by using methods of constructing reverse slope pits, "spill platforms" and "splash cushions" with stone slabs. This again is mostly required in new planting areas. (See Diagram No. 1).

DIAGRAM No. 1



Lateral Storm Drains.—When the land to be planted is on any other part than the top, it is essential to construct a storm drain along the upper boundary. This will prevent any run-off water of external origin working down the land.

The storm drain should be connected to the main drains.

Lateral Drains.—These drains will be on the contour with a slope of about 1 in 120. It is essential that these drains should be completed before the heavy monsoon rains, especially if a ground cover has not been satisfactorily established.

The lateral drains will be of the silt-pitted type. When replanting, use can be made of existing drains if their gradient is not excessive. The more steep drain sections can be plugged at 10—12 feet intervals with stone spill-ways to make more efficient lock and spill-blocks or these can be done away with by extending existing drains on a more level contour.

New lateral drains should be spaced according to the gradient of the land as follows:—

The intervals for the drains are measured up and down the slope at right angles to the contours, according to the average slope of the land. The following spacing for lateral drains will satisfy the requirements for the satisfactory control of run-off water.

(*a*) Spaced 72 feet for gradients of 1 in 20 and under, including flat land.

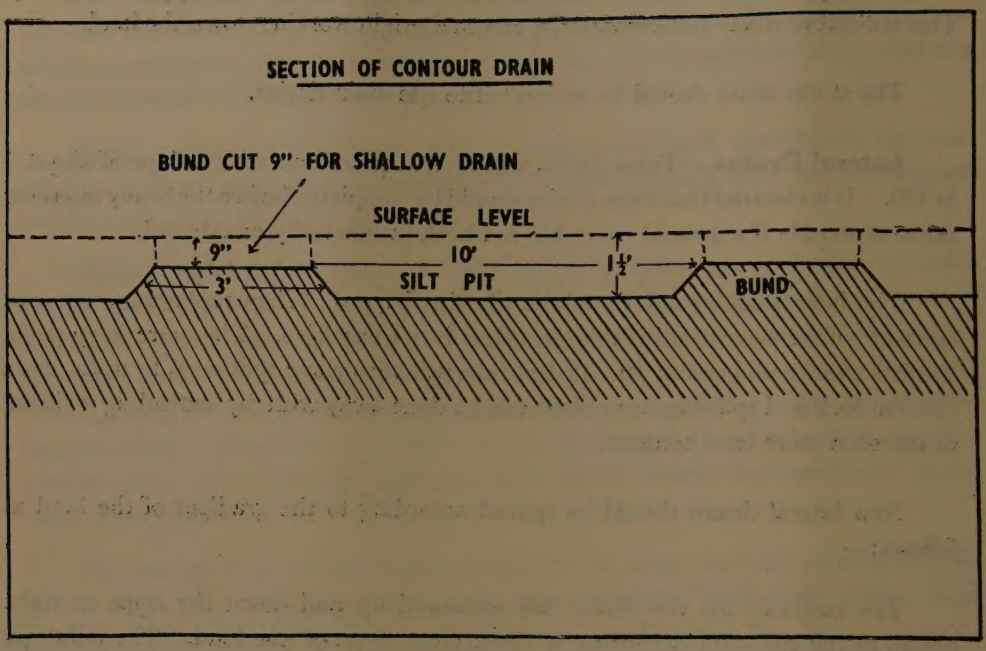
(*b*) Spaced 48 feet for gradients between 1 in 20 and 1 in 4.

(*c*) Spaced 24 feet for gradients over 1 in 4.

The tracing of the lateral drains can be done independently of the planting rows. Commencing from the middle of two planting rows, which are approximately level contours, the spacing of lateral drains can bring the drain lines within 5 to 6 feet of the planting rows. In square planting these lateral drains often cross the planting rows, in other words it is not necessary to have lateral drains exactly in the middle of the planting rows, and the recommended distances can be adjusted to suit particular planting distances.

The type of drains recommended by the Rubber Research Institute consists of a series of silt pits 10 feet long, 2 feet wide and $1\frac{1}{2}$ feet deep spaced at intervals of 3 feet and connected by shallow drains on a depressed bund of the same width (see Diagram 2). With a slight gradient of 1 in 120 provision is made for overflow of surplus water into main drains.

DIAGRAM No. 2



In practice skeleton drains are cut throughout the area as quickly as possible to a depth of 9 inches and the 10 feet long silt-pits are cut afterwards. The total depth of drain from surface level is 1½ feet. The earth cut from the drains should be heaped on the lower side of the drain in a continuous ridge. The cutting of drains should be started at the top of the slope.

Contour Stone Terraces.—(See diagram No. 3) On very rocky land, where it is almost impossible to construct continuous lateral drains, the soil conservation needs are partially satisfied by the construction of level contour stone terraces. These terraces can check the rate and distance of movement of surface run-off water. The eroded soil will be deposited on the upper sides of the terraces, and the water will filter through the terrace. As in the case of lateral drains the distances between terraces should be adjusted according to the slope of the land.

One of the main points about contour terraces is that, unless contour drains are subsequently constructed along the line of deposited soil, the terraces require annual repair. As the amount of eroded soil deposited on the upper surface increases, a further building up of terraces may be necessary. This requirement is greatly minimised by the maintenance of a good ground cover.

Alternatively the establishment of a contour erect cover on the accumulated eroded soil will protect the terraces from a direct impact of run-off water. A more permanent erect cover for this purpose would be Tripsacum laxum (Guatemala grass).

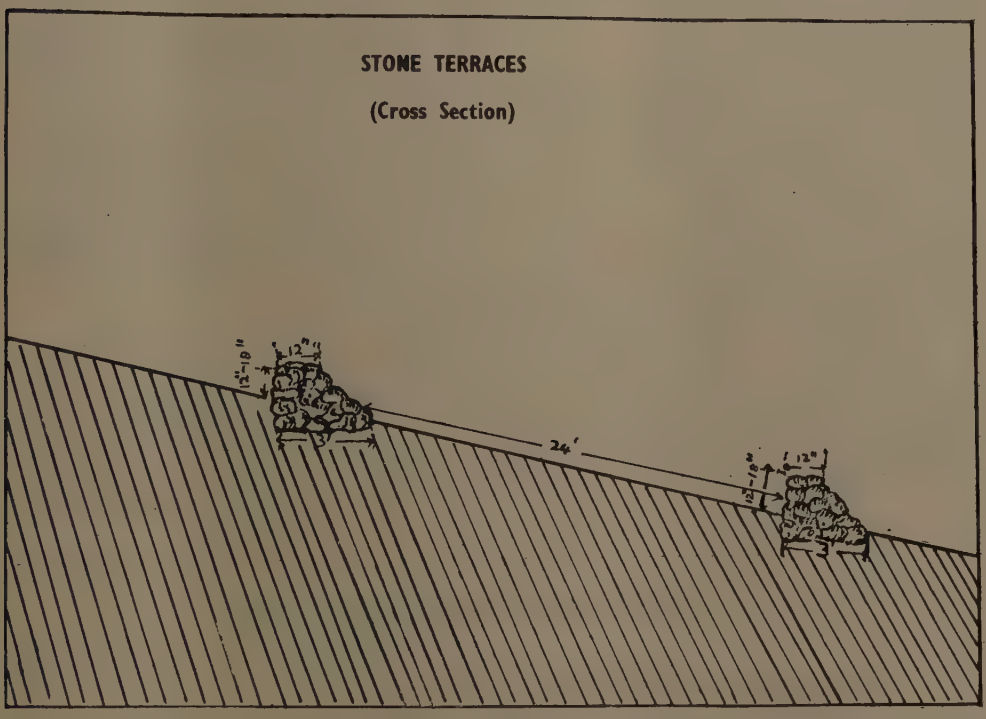
Particular attention must be paid to the construction of permanent stone terraces as follows :—

(1) The upper side of the terrace must be on a perfect contour.

(2) The base of the terrace should be wider than the top for a stable terrace.

(3) The lower side of the terrace should have a slope towards the hill side (See diagram No. 3.).

DIAGRAM No. 3



(4) The base of the terrace should be built with large even stones. The stone should be laid with a reverse slope to that of the land; to effect this beds should be cut into the hillside as in diagram 3. Stone terraces can be built with a 3 feet base converging to 12 inches at top level and 18 inches above ground level on the upper side.

Draining Low-lying Land.

It is first necessary to determine whether it is possible to have a satisfactory outlet into a natural or artificial drainage line. If this cannot be done the land must inevitably remain as a swamp which is unsuitable for rubber growing.

If an outlet for water can be obtained it is possible to dry the land with a series of deep lateral drains. The depth of the drains should be maintained throughout their entire length.

A point to remember is that drains should not be cut deeper than the normal height which the water table assumes after the draining of the land has been completed.

Holing.

Lining for holing.

If dead level contours are marked with a road tracer starting from the steepest part of the land, the contour lines will diverge to finish off as unbroken contours. It is then necessary to mark in subsidiary contours in spaces which exceed approximately double the planting distance between holing rows.

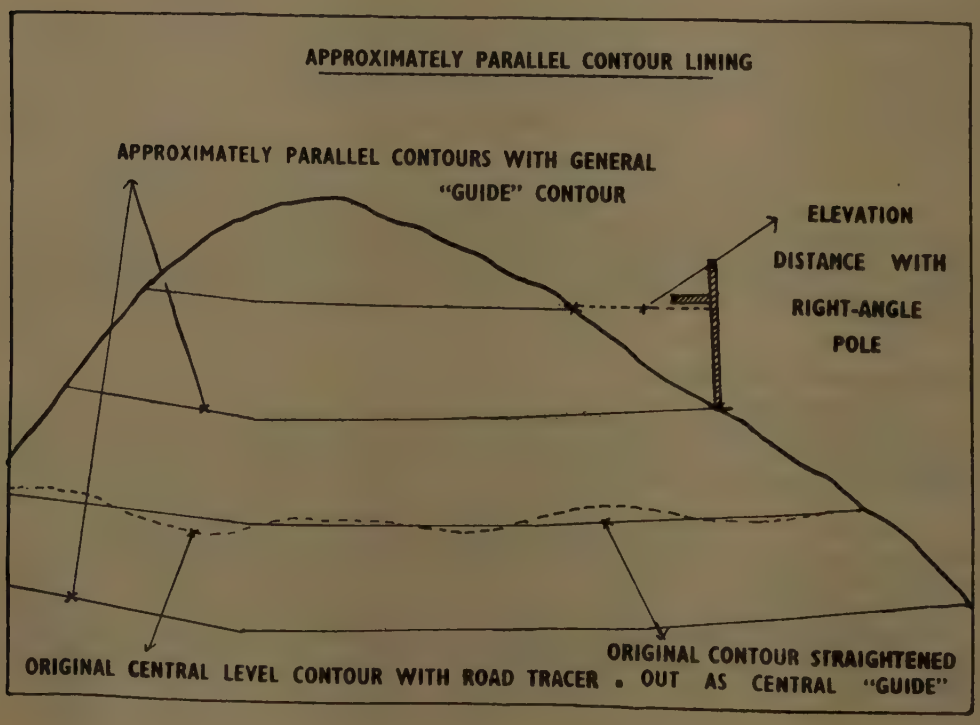
Our present recommendations are that this should be avoided by adopting a compromise between contour and straight line holing.

Depending on the general lie of the land suitable areas are selected between natural main drains for a continuous dead level contour which is then pegged centrally between the top and bottom of the land. The contour line can then be straightened out as given in diagram 5.

Approximately parallel continuous planting lines are then marked above and below this central "guide" contour line. Where the terrain is not difficult the centre "guide" contour line can be marked through the whole clearing. In order to space correctly on steep land it is essential to take the elevation distance according to the stipulated distance between contour rows of holes and not along the surface of the slope, (see diagram 5). On gently undulating and flat land the distance along the surface of the land will be sufficiently accurate.

This method of lining ensures evenly spaced continuous contour planting rows with the minimum use of the tracer. A pole with a right-angle cross stick and length of rope is used for taking the elevation distance from the central "guide" contour at a sufficient number of points for completing the approximate parallel contours above and below the central contour, see diagram No. 5.

DIAGRAM No. 5



Distances for Holing.

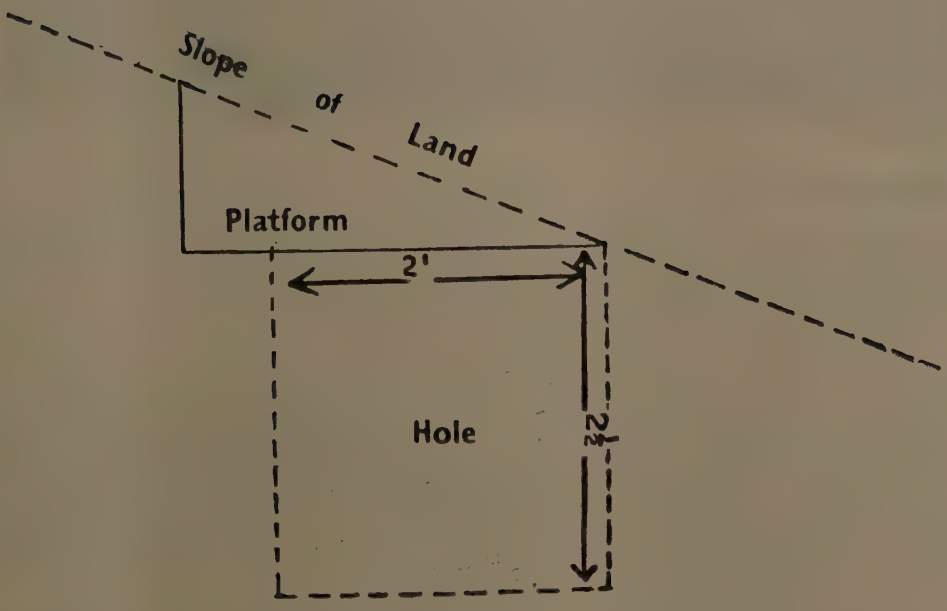
Budded Rubber.—	8′ × 30′	giving	180	points	per	acre
	12′ × 20′	,,	,,	,,	,,	,,
Clonal Seedlings.—	6′ × 30′	,,	240	,,	,,	,,

The size of holes generally recommended is 2 feet x 2 feet by $2\frac{1}{2}$ feet deep. When digging a hole it is best to leave the top-soil and sub-soil in different places around each hole. The top soil should be used for re-filling together with surface soil which may be available near the holes.

On undulating and steep land it is essential to cut holes on sizable individual platforms. Failure to do this will result in serious erosion on the upper slope of the section of the hole with consequent root exposure of the mature trees. The correct method is given in diagram 4.

DIAGRAM No. 4

Hole on Individual Platforms



When holing is done on the contour, the individual platforms of each hole can be connected by a narrow ledge of about 2 feet width for about Rs. 25/- per acre. This will save the tappers' time for moving from tree to tree on difficult land. The tapping task could also be increased for reducing the costs of tapping and collection.

A NOTE ON THE CHEMICAL CONTROL OF THE WHITE ROOT DISEASE OF RUBBER

By

Alfred Riggenbach

Introduction :

The White Root disease of rubber, caused by Fomes lignosus (Klot) Heim ex-Pat, is a fairly widespread disease in Ceylon. The disease causes considerable losses, especially in replanted areas, in the second to the fifth year from planting. It has often been observed that old rubber stands (40 or more years) are heavily infected by Fomes lignosus without the trees showing any external signs of the disease. Small pieces of infected roots left undetected in the soil when uprooting these old trees form a ready source of infection for the replanted trees.

As the White Root disease is of great commercial importance, and as the present methods of controlling the disease are not too satisfactory, a chemical method of control was sought as hitherto no serious attempts at finding a suitable fungicide had been made.

The present note gives an account of the results so far obtained in our investigations.

Methods:

Before selecting a fungicide suitable for use in field experiments a number of fungicides were tested in the laboratory for their suitability to control the growth of the causal agent of the White Root disease of Hevea.

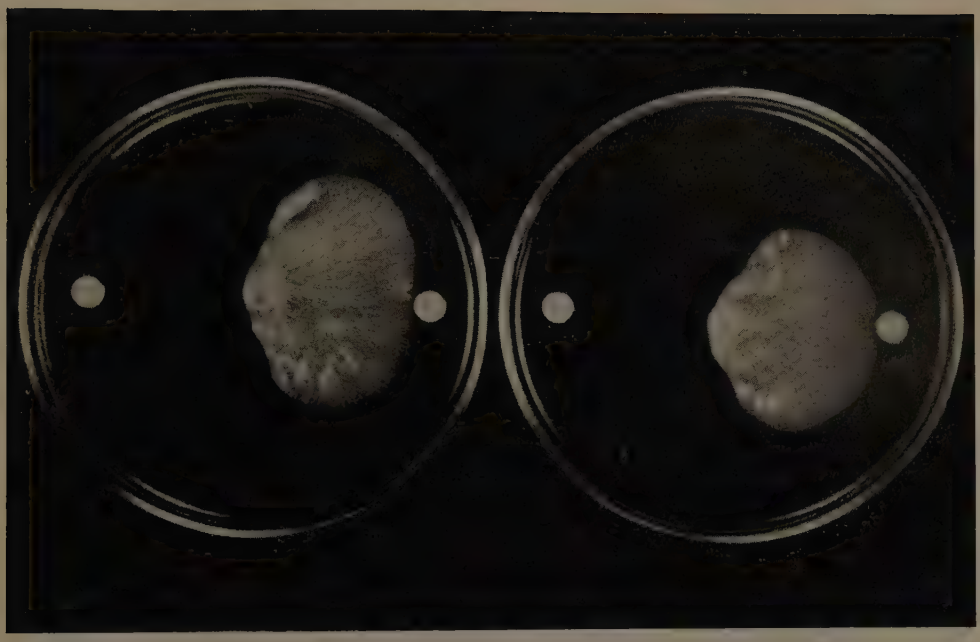
For this purpose three different tests were carried out.

In the first test the fungus, Fomes lignosus, was allowed to grow on an artificial medium in Petri dishes towards small filter paper discs impregnated with a certain fungicide of a known concentration. A growth inhibition circle was formed around the paper discs impregnated with the fungicides which were effective against the fungus ; the more effective the fungicide the larger the diameter of the inhibition circle. The size of these growth inhibition circles was measured and compared with that caused by other fungicides.

In the second test the fungicides were added to a liquid culture medium contained in Erlenmeyer flasks. The flasks were inoculated with a piece of a pure culture of Fomes lignosus. Later the growth rate of the fungus in different fungicidal solutions and of concentrations was compared.

The third test followed the methods devised by Zentmyer to test soil fungicides. The advantage of this test is that the fungicide is tested when mixed with a small quantity of soil.

DIAGRAM A.



Left Petri dish: *Left disc :* Tillex solution (1% active material) inhibits growth of Fomes lignosus completely.

Right disc : Copper sulphate solution (1% Copper) has no effect on growth of Fomes lignosus.

Right Petri dish: *Left disc :* Tillex solution (1% active material) inhibits growth on Fomes lignosus completely.

Right disc : Wettable sulphur solution (1% sulphur) has no effect on growth of Fomes lignosus.

DIAGRAM B.

Left Petri dish: *Left disc :* Fylomac 90 solution containing 1% of the commercial product and

Top disc : Fylomac 90 solution containing 0.28% of the commercial product

have only a very slight inhibiting effect on the growth of Fomes lignosus.

Bottom disc : Fitox solution containing 1% copper and

Right disc : Copper sulphate solution containing 1% copper

have no effect at all on the growth of Fomes lignosus.

Right Petri dish: *Left disc :* Captan solution containing 10% active material and

Top disc : Captan solution containing 1% active material and

Bottom disc : Brunolinum plantarium solution containing 20% of the commercial product

have only a very slight effect on the growth of Fomes lignosus.

Right disc : Brunolinum plantarium solution containing 1% of the commercial product

has no effect at all on the growth of Fomes lignosus.

Fungicides:

The fungicides tested were :

Sulphur-based fungicides:	Sulphur dust, Sulphur wettable preparation, Sulphur colloidal preparation.
Copper-based fungicides:	Copper sulphate, Copper oxychloride wettable preparation, Cuprous oxide wettable preparation.
Mercury-based fungicides:	Mercuric chloride, Agrosan, Tillex Liquid.
Carbamate-based fungicides:	Di-sodium ethylene bis-dithiocarbamate, Ferric dimethyldithiocarbamate, Manganese ethylene bis-dithiocarbamate, Nickel dibutyl dithiocarbamate, Zinc dimethyldithiocarbamate, Zinc ethylene bis-dithiocarbamate.
Other fungicides:	Brunolinum plantarium, Captan, Fylomac 90, Karathane, Phygon, Thiuram.

Results of the laboratory tests:

In these laboratory tests Tillex, an organo-mercury compound, was shown to be the most effective fungicide and to have the greatest fungicidal potentialities against Fomes lignosus. This fungicide was therefore selected for further experiments.

Some results of the laboratory tests are shown in diagrams A and B.

Phytotoxicity:

Before starting field experiments Tillex was tested for its phytotoxicity and the tests showed that it has no phytotoxic effects on budded stumps or on young rubber seedlings.

Field Experiments:

Experiments carried out on a number of commercial estates showed that Tillex could with greatest advantage replace Copper sulphate in the method described in R.R.I.C. Advisory Circular No. 46, giving a very high percentage of successes.

Whether the regular use of Tillex after planting can eliminate or considerably reduce the outbreak of the White Root disease in replantings is under investigation in our field experiments.

Suggestions:

As a result of the experiments carried out we would suggest the following treatments:

(*a*) **Preventive Treatment.**—The common practice to dip budded stumps before planting into a cow dung solution should be abandoned. Cow dung is not only an excellent culture medium for the White Root disease fungus but also for various other fungi and bacteria. Stumps dipped in cow dung solution are therefore more likely to be infected with the White Root disease.

Roots of young rubber plants may, before they are planted out, be dipped in a 5% solution of Tillex. This solution should be allowed to dry on the roots before the young plants are put out. Dipping of the roots of the young plants is strongly recommended if White Root disease is known to be present in the nursery.

After planting, the soil around the young plants may be thoroughly watered with a solution of 1% Tillex and this treatment may be repeated two or three times at intervals of 2 to 3 months, using about ½—1 gallon of diluted liquid per plant.

As with time the roots of the young trees will grow out of the treated soil area, infections from centres lying farther away may naturally occur later but the incidence of infection would be expected to be greatly reduced as a result of this soil treatment.

(*b*) **Curative Treatment.**—The method is in principle the same as that described in our Advisory Circular No. 46 but, instead of Copper sulphate, the more effective Tillex is recommended. The treatment can be carried out on all trees, irrespective of their age, if they are still alive. If a rubber plant shows signs of Fomes infection, the earth around the roots is excavated and the source of infection, parts of old roots or timber, are removed. The white mycelium of Fomes lignosus on the roots is then carefully scraped off with a hard brush or knife or other suitable tool. Small infected roots or rootlets which cannot be treated are cut away. The roots are then thoroughly painted with a 1% solution of Tillex and the solution is allowed to dry on the roots. The earth is then replaced in the hole and the soil in the immediate vicinity is saturated with the same (1%) solution of Tillex.

Alternatively the soil may also be watered with the Tillex solution before being replaced in the excavated hole.

About 2½—3 gallons of 1% Tillex solution will be required for trees up to the age of about 2 years; for larger and older trees with a wider lateral root spread larger quantities of the solution may be needed.

After about three months the roots may be inspected again and the treatment repeated if necessary. As a precautionary measure it is advisable to repeat the watering with the Tillex solution after the soil has been loosened with a fork.

In cases where the root system is already widespread preventive treatment of neighbouring trees is advisable, particularly the trees adjoining or opposite the sector where the infection is found, and the soil between the trees should be watered with the Tillex solution.

WARNING:

Tillex Liquid is poisonous and should be handled with care. Hands or other parts of the body which have come into contact with the liquid should be thoroughly washed after work and before taking meals.

Literature:

1. Young, H. E., R.R.I.C. Advisory Circular No. 46.

2. Zentmyer, G. A., Phytopathology, **45**, p. 398—404.

RHIZOBIAL INOCULATION OF LEGUMINOUS COVER CROPS.

(1) Rhizobial strain QA. 548 b.

Three pots on the left : uninoculated. Three pots on the right : inoculated.

(2) Rhizobial strain QA. 549.

Three pots on the left : uninoculated. Three pots on the right : inoculated.

RHIZOBIAL INOCULATION OF LEGUMINOUS COVER CROPS

By

A. J. Jeevaratnam

It has long been known that legumes can grow and produce crops even in soils poor in nitrogen and that they can even increase the amount of nitrogen, thus enriching the soil in which they are grown to the benefit of succeeding crops. It is for this reason that leguminous plants are desired as ground cover under rubber in Ceylon.

Legumes are able to fix nitrogen due to the infection of the legume roots by certain soil-inhabiting bacteria called rhizobia, that produce nodules in which atmospheric nitrogen is fixed. Such nodule formation and nitrogen fixation can take place only if the appropriate nodule bacteria are present in adequate numbers in the soil.

Several strains of rhizobia are known to exist. With any one legume species some strains are more effective than others, whereas others may be totally ineffective. Being widely distributed in the soil they will sometimes induce nodulation of cover crop plants without special measures being taken; but, to ensure nodulation with a good strain for effective nitrogen fixation, seeds should be inoculated before planting.

Doubts have been expressed on the nitrogen-fixing capabilities of some of the leguminous covers that are grown under rubber in Ceylon. Therefore several rhizobial strains, both indigenous and imported, were tested for their nitrogen-fixing capabilities on *Pueraria phaseoloides*, *Centrosema pubescens* and *Desmodium ovalifolium*, the three most popular cover crops grown under rubber in Ceylon.

Two of these strains have given good results in nodule formation and effective nitrogen fixation in tests carried out in pots at the research laboratories, as illustrated in the photographs. These strains were also found effective in certain types of soil under field conditions.

These rhizobial strains are now available in culture form in tubes and may be obtained from the R.R.I. at a cost of Re. 1/- per tube. (One tube will be sufficient to inoculate 20 lb. of seeds).

Those desirous of introducing these better types of rhizobial strains before planting out leguminous covers are requested to write to the Rubber Research Institute for the rhizobial cultures and for further particulars.

A NEW WATERPROOF FUNGICIDE

By

Alfred Riggenbach

For the treatment of Bark Canker of rubber trees caused by Phytophthora palmivora two groups of products, *i.e.* water-miscible fungicides and waterproof dressings have so far been used on estates.

The accepted practice in Ceylon is to apply a water-miscible fungicide to a scraped canker lesion followed by, on a dry day, an application of a waterproof grease material as a protective cover.

As a considerable saving would result from the use of a material combining the effects of the water-miscible fungicide and the inert protective cover tests have been carried out during the past year with a new type of fungicide with waterproof properties.

A mercury-based product, called "Kankerdood," has been found in our experiments to possess the advantages of water-miscible fungicide and waterproof dressing.

Kankerdood is of paint-like consistency and is best applied to wounds by means of a good paint brush. This fungicide, though not grease-based, as are the usual waterproof dressings, is not washed off by rain water. Furthermore it does not seal off the wounds so completely as do the usual grease-based waterproof dressings and thus allows the growing tissues to respire to a certain extent under the protective cover. Collection of water droplets under this fungicide dressing, as is frequently the case with grease-based products, has not been observed in our experiments and wounds treated with Kankerdood were found to callus over quickly and heal well.

Treatment of old canker patches.

All diseased and discoloured tissues are removed as carefully as possible with suitable tools and the edges of the wound are trimmed smooth. A water-miscible fungicide may then be applied, but this is not really necessary with Kankerdood which is an excellent fungicide by itself. The dry cleaned patch is painted over with Kankerdood and this operation may be repeated at intervals of 4 to 6 months.

Kankerdood is poisonous to man and should be handled with great care. It is safest in practice if the application of Kankerdood is always carried out by the same gang of labourers. Hands or other parts of the body which have come in contact with Kankerdood should be well washed after work and before taking meals.

The R.R.I.C. recommends the use of Kankerdood for the treatment of bark cankers but does not accept any liability or responsibility for accidents which may occur through careless use of this fungicide or, for that matter, of any other materials which are tested and reported on by the Institute.

The use of Kankerdood for the treatment of stem cankers of pome fruit trees is officially recommended by research institutions in France, Holland, Germany, Norway and Switzerland.

"Canker" (artificial wound)

treated July 1957 with one coating of Kankerdood.

Photograph taken January 1958.

Note excellent callusing around the wound and absence of phytotoxic effects (burning).

The heavy SW monsoon showers failed to wash off the fungicide.

FURTHER COMMENTS ON THE CONTAMINATION OF NATURAL RUBBER BY FUNGICIDAL DUSTS CONTAINING COPPER. PART 1.

By

E. J. Risdon

1. Introduction :

The Report for 1954 (p.31-32) indicated, rather tentatively, that on the basis of the analysis of less than 100 samples of latex rubbers the proportion of latex rubbers, other than R.M.A. 5 sheet, which could reasonably be expected to have copper contents above 8 parts per million (p.p.m.) should not be very large. The figures did not, however, indicate that the copper content of even R.S.S. 1 is necessarily zero under normal conditions. In the Report for 1955 (p.32-35) the conclusions from the above small survey and from its extension, again on a small scale, to scrap crepes were utilised to imply that in the event of the large scale use of copper-containing fungicides against leaf and/or panel diseases the extent of the permissible additional contamination in the form of copper was not 8 p.p.m., but a figure below this value. At the same time brief reference was made to the published literature and other information on the extent of contamination likely to be found under commercial conditions and, following an examination of certain samples collected from one of the Department's long term dusting experiments, it was concluded that the very limited recent information available with respect to Ceylon conditions did not then justify the Department in advising against the careful use of fungicidal dusts containing relatively small amounts of copper on a restricted experimental scale in 1956. However, it was emphasized that, on the basis of earlier published information and of reasonable supposition, the Department did not accept any suggestion that the extent and seriousness of contamination would necessarily be negligible under normal dusting and processing conditions, *i.e.* in the absence of special precautions. In early 1957 the Department published (R.R.I.C. Quarterly Circulars 1957 33-1,2 p. 35-38) a summary of work carried out in 1956 which indicated that, under the conditions employed, about 9% of all the analytical subsamples drawn from the processed scrap crepes, obtained from commerical and experimental dusted areas, had copper contents in excess of about 7.9 p.p.m. The extent of contamination found in latex rubber samples was of a much lower order. On the basis of the information then available, certain rather stringent suggestions for the minimisation of contamination during the 1957 dusting season were included.

2. The Application of Controlled Blending Procedures :

Detailed examination of the information available for the 1955 and 1956 dusting seasons on commercial estates alone (Table No. 1) suggests that, although nearly 7% of the scrap crepe subsamples have copper contents of not less than 7.9 p.p.m. the highest values being 179 and 100 p.p.m., the mean value is only 6.0 implying that if all the samples tested were fully representative of blocks of rubber of equal size and that if the latter were sold as one lot or consignment truly representative, samples of this consignment would have an average copper content below 8 p.p.m.

However, the Rubber Manufacturers' Association of New York's type descriptions state that the copper content of any R.M.A. type or grade of rubber shall not exceed the maximum tolerance of 8 p.p.m. and reference to the Association has shown that the practice normally adopted is that the copper content of the sample taken for visual inspection must not exceed the above limit. Further if the presence of copper is suspected, "the sample is naturally taken from the spot or spots under suspicion." Although it would appear that buyer's and seller's representatives agree to the piece of rubber that is subsequently submitted to chemical analysis, it is (and has been for some time) our view that for purposes of sale on the open market there does not appear to be much justification for the contention that a significant portion of any lot of R.M.A. type rubber can have a copper content sensibly or noticeably above 8 p.p.m.

TABLE No. 1

Small (and Medium) Scale Dustings on Commercial Estates, Summarizing Data, 1955–1956.

Sample Type	No. of Readings	Mean	% ≥ 7.9 p.p.m.	Highest Values
Latex Rubbers, Dusted Areas	124	1.5	0.08	9
Scrap Crepes, Dusted Areas	160	6.0	6.9	179, 100.
Latex Rubbers, Control Areas	67	1.1	0.0	3
Scrap Crepes, Control Areas	93	3.5	0.0	7

It appears appropriate for the purpose of simplification to differentiate between the extent of contamination, *i.e.* the % of samples which have copper contents of not less than 8 p.p.m., and the seriousness of contamination, *i.e.* the difference between the numerical value of the copper content of the contaminated samples and the specification limit of 8 p.p.m. Thus, in terms of Table No. 1, we would suggest that the latex rubbers from the dusted areas were neither very extensively nor very seriously contaminated and that the scrap crepe subsamples from the commercially dusted areas appeared to be both extensively and seriously contaminated. Pending the collection of further information, we therefore concluded that for the 1957 dusting season, when rather larger numbers of estates might be expected to employ dusts containing copper with varying degrees of care in the prevention of contamination, relatively drastic measures should be recommended in order to minimize the risks of both extensive and serious contamination of scrap crepes. Where neither the extent nor the seriousness of contamination are unduly high, it may be reasonable to anticipate that *properly controlled* blending of scraps during process will lead to a substantial and, perhaps, sufficient reduction in both the extent and seriousness of contamination. However, preliminary blending experiments at R.R.I.C. with artificially coloured scraps and coagulum did not suggest that the normal scrap process will invariably be sufficient.

TABLE No. 2

Copper Contamination of Commercial Estates' Samples, Summarizing Data 1957.

Row No.	Sample Type etc.	No. of Readings	$(\bar{x})$ Mean	(σ) S.Devn.	% $\geq$ 7.9 p.p.m.	$\bar{x} + 5\sigma$
1	Latex Rubbers. Dusted Areas. (Samples Homogenised).	189	0.8	0.4	0.0	2.8
2	Latex Rubbers. Dusted Areas. (Samples Unhomogenised).	46	0.9	0.5	0.0	3.4
3	Latex Rubbers. Control Areas. (Samples Homogenised).	50	0.9	0.4	0.0	2.9
4	Latex Rubbers. Control Areas. (Samples Unhomogenised).	19	1.0	0.8	0.0	5.0
5	Scrap Crepes. Dusted Areas. (Samples Homogenised).	135	3.0	2.0	1.5	13.0
6	Scrap Crepes. Dusted Areas. (Samples Unhomogenised).	64	3.5	2.7	3.1	17.0
7	Scrap Crepes. Control Areas. (Samples Homogenised).	38	2.2	0.8	0.0	6.2
8	Scrap Crepes. Control Areas. (Samples Unhomogenised).	23	2.3	0.8	0.0	6.3

Detailed examination of the data summarized in Table No. 2 suggests that both the extent and seriousness (highest figure just over 20 p.p.m.) of contamination of the 1 to 4 scrap crepe samples obtained from areas dusted on commercial estates is reduced in 1957 in comparison with 1955+1956 (Table No. 1). Presumably this lower extent and seriousness of contamination in 1957 is due *inter alia* to one or more of the following: (1) more, rather than less, care in the field, (2) more favourable climatic conditions and (3) selection, in many cases, of samples more representative of the overall mean copper contents per treatment and per day. The implication of (3) is not that the samples were specially 'hand picked', but that the extent of dusting, the procedures of sampling and the size of the samples in 1957 may have been equivalent to a greater degree of accidental blending. Provided the reduced extent and seriousness of contamination is not wholly or substantially due to climatic factors—and this is obviously a questionable proviso— there is a strong probability that, if in 1958 at least equal care is taken in the field, further properly controlled blending might result in an even greater reduction in the extent and seriousnesss of contamination. The limited information already available on (1) the nature of the variation of the copper content of scraps between samples within areas and days, between days etc. and on (2) variation of the copper content between finished blankets within invoices leads us to presume that the procedures which should be followed, for the scraps drawn from areas dusted with copper-containing fungicides in the 1958 phytophthora season, should probably involve (1) the controlled blending of scraps before milling , *i.e.* controlled mixing across and within areas and days of collection, (2) the controlled blending of scrap crepe laces before blanketing, *i.e.*

possibly application of the Sumatran trough blending technique, (3) the application of a blanketing procedure designed to make the best use of a trough blending technique for laces, (4) the selection and examination of sufficient samples, from probably each blend of scrap blankets, to indicate the mean and the standard deviation of the copper content of the finished blankets and possibly (5) a change in method of scrap maceration to what we have called the 90° turning method and/or preparation of scrap lace by a modified intermediate type process involving the blending of partially dried laces with further wet milling. Further and more precise suggestions on blending procedures etc. will probably be circulated in Ceylon (information Leaflet C/58/2) and published in this journal at a later date. Preliminary work suggests that the procedures in mind for shell and panel scraps drawn from dusted areas only may reduce the standard deviation of the copper content by at least 50%. The procedures in mind naturally require a little more attention to detail, etc. than is customary at present, but it is not anticipated that the extra cost will be very great. It might be mentioned in this connection that the procedure of 'diluting' scraps from dusted areas with eight to ten times their weight of 'normal' scrap is, in our present opinion, not likely to be entirely satisfactory without alteration to the conventional scrap process on estates. In the absence of more suitable criteria, which might be developed later, we may in 1958 carry out the blending and other treatments with the object of arriving at a mean copper content well below 8 p.p.m., and at a $\bar{x}c+5\sigma$ (mean + 5 times the standard deviation) value of not above about 10 p.p.m.For this purpose it is at present intended that 'blends' of scrap blankets whose $\bar{x}c+5\sigma$ value is not less than 10 p.p.m. shall be retained for further treatment or rejection, and that when the $\bar{x}c+5\sigma$ value is greater than 8 p.p.m. but less than 10 p.p.m., the blend shall be resampled pending a final decision.

While it has been implied on the basis of the information summarized herein, that properly controlled blending might be a practical proposition in 1958, those Agency Houses and Proprietors which wish to pursue this subject with the R.R.I.C. in 1958 must appreciate that they are taking a calculated risk in so far that (1) there is insufficient data to indicate with certainty whether the extent and seriousness of contamination is significantly influenced by the effect of climatic variations from year to year, and that (2) although the R.R.I.C. has emphasized the importance of care in the field and factory it cannot guarantee that the need for such care will be appreciated and acted upon on commercial properties.

As a summarizing comment it might be mentioned that the Department would still welcome the introduction of a cheap and effective alternative fungicide which has little or no influence on the technological properties of natural rubber. A note on the latter subject may be published elsewhere.

3. Earth Scraps :

It has been suggested to us from time to time that one sensible way out of the contamination of scraps difficulty would be to sell panel and shell scraps drawn from copper dusted areas as earth scraps. Although it is perhaps not unduly unreasonable to expect consumers to allow a considerable measure of latitude in the case of the relatively cheap earth scraps, there does not, in fact, appear to be any qualifying clause in the R.M.A. type descriptions which permits earth scraps to have more than 8 p.p.m. of copper. Possibly a rather more valid local objection is that there is no guarantee that Dealers or Packers would not upgrade the lighter coloured 'panel and cup scraps without reference to possible technological objections. The information at present available to the R.R.I.C. on the copper content of processed earth scraps is at present limited, and in the covering letter [ref. No. C/2 (a) Ch of 25-1-58] to Information Leaflet No. C/58/1 Agency Houses and Proprietary Planters

were asked to instruct the resident Managers and Superintendents of estates which sell processed earth scraps to despatch samples of processed earth scraps to the R.R.I.C. for examination. As the response to this request has been unusually poor, we would mention that the original intention was to obtain samples early in 1958 (*i.e.* before the copper dusting season), and to request further samples, collected only from copper dusted areas, shortly after the end of dusting.

4. Selection of the Dusting Compound :

On the basis of tests carried out under the control of the R.R.I.C. and by commercial estates, the Plant Pathologist of the R.R.I.C. has suggested that under the recommended conditions 6% and 4% approved copper dusts formulated without a sticker are approximately equivalent in terms of fungicidal efficiency to each other and to approved and tested 1% dusts containing a sticker. It is, therefore, of considerable interest to ascertain what information is available *vis-a-vis* the probability of contamination on the choice of dusting compounds. The information summarized in Table Nos. 3 and 4 refers to samples collected by the Chemistry Department at one or more periods of time, not necessarily the conventional phytophthora season, between August 1955 and September 1957 from relatively small scale ($1\frac{1}{2}$ to 5 acres) dusting trials organised and carried out by the Chemistry Department.

TABLE No. 3

Comparison of Dusts in terms of Processed Scrap Crepe Samples at R.R.I.C.

Row No.	Dusts Used	Dusted Areas					Control Areas			
		No. of Readings	$(\bar{x})$ Mean	(σ) S. Devn.	% $\geqq$ 7.9 p.p.m.	$\bar{x} + 5\sigma$	No. of Readings	$(\bar{x})$ Mean	σ S. Devn.	$\bar{x} + 5\sigma$
1.	Cuprosana 6%	92	6.1	5.9	18.5	35.6	8	4.4	1.1	9.9
2.	Blidust 4%	205	5.5	6.1	14.6	36.0	91	3.4	1.4	10.4
3.	Copper Sandoz 4%	84	12.4	8.5	58.0	54.9	—	—	—	—
4.	Ciba 1%	60	4.0	1.9	6.7	13.5	82	3.0	1.1	8.5

The conclusion that, in terms of the contamination of processed scrap crepe samples, the order of preference of the dusts would be (1) Ciba 1%, (2) Blidust 4% (3) Cuprosana 6% and (4) Copper Sandoz 4% may not be wholly justified as the number of samples tested is not invariably large and because a proper statistical layout could not be followed for obvious practical reasons. It should, however, be noted that with Ciba 1% dust the numerical value of $\bar{x}+5\sigma$ is not high suggesting, on the basis of the limited data available, that relatively little extra blending should be required to meet the specification.

TABLE No. 4

Comparison of Dusts in Terms of Processed Latex Crepe Samples at R.R.I.C.

Dusts Used	Dusted Areas					Control Areas			
	No. of Rdgs.	($\bar{x}$) Mean	(σ) S. Devn.	% $\geq$ 7.9 p.p.m.	$\bar{x}+5\sigma$	No. of Rdgs.	($\bar{x}$) Mean	(σ) S. Devn.	$\bar{x}+5\sigma$
Cuprosana 6%	48	2.1	1.9	2.1	11.6	5	1.5	0.8	5.5
Blidust 4%	113	1.7	1.6	0.9	9.7	22	1.8	0.8	5.8
Copper Sandoz 4%	43	2.0	2.2	2.4	14.0	—	—	—	—
Ciba 1%	30	0.8	0.3	0.0	2.3	41	0.9	0.4	2.9

In terms of the contamination of latex crepes there would again appear to be evidence in favour of Ciba 1% dust, which is probably attributable to the fact that apart from being a dust with only 1% of copper it contains a relatively effective sticker. The relatively poorer behaviour of Copper Sandoz 4% dust may be due to the presence of a wetting agent which probably facilitates removal of the copper from the leaves and trunk during monsoon showers. As Ciba 1% dust has been classified by the Plant Pathologist as effective from a fungicidal point of view (when applied correctly), there would appear to be justification for extending its use in 1958 in commercial trials, provided the dust is available in quantity and at a reasonably competitive price. It is anticipated that further information will be available in 1958 on Ciba 1%, on Copper Sandoz 1% and possibly on mixed dusts containing even lower amounts of copper 'fortified' by a suitable organic or organo-metallic fungicide.

As the Department has upto the present always been in favour of the use of low copper content dusts with an appropriate sticker it is, perhaps, permissible to mention here that the choice of a suitable sticker may well be somewhat critical. Thus, a highly efficient sticker which 'hammers' the copper onto the leaf at the point of lodgement of the dust particle might impair the fungicidal properties in so far that leaching by rain or dew would not lead to the establishment of a 'molecular' film of copper over the surface of the leaves. However, an inefficient sticker might not minimize the washing down of copper into the latex or onto the scraps during light showers and might also have to be used with more than 1% of copper. It is for this reason that reference is made to 'approved and tested 1% dusts containing a sticker.'

5. Rainguards. Boundary Effects:

It is reasonable to presume that apart from difficulties arising during partial or complete washouts the major sources of contamination under conditions of at least some care in the field will include (1) showers washing copper off the leaves and trunks onto the scraps and (2) wind, with or without rain, blowing dust onto the scraps. Both of these difficulties could be overcome by the use an effective protective cover over the panel and the cups, and on the presumption that washing down was the more important factor considerable time has been given to testing a new type of rainguard, referred to as the Ceylon Institute of Scientific and Industrial Research rainguard, for which a patent application has been filed in Ceylon.

TABLE No. 5

Boundary Effects and Rainguards with Copper Dusts in Terms of Processed Crepe Samples at R.R.I.C.

Row No.	Sampling Location, etc.	No. of Readings	$(\bar{x})$ Mean	(σ) S.Devn.	% $\geqq$ 7.9 p.p.m.	$\bar{x} + 5\sigma$
1.	Area with 2-3 Boundary Rows (on 1 side) from 4% Blidust Areas (Scraps)	32	3.7	1.3	3.1	10.2
2.	Area with 10-12 Boundary Rows (on 1 side) from 4% Blidust Areas (Scraps)	82	3.0	1.1	1.2	8.5
3.	4% Blidust Area with Single C.I.S.I.R. Rainguards (Panel)	41	5.5	3.6	14.6	23.5
4.	4% Blidust Area with Single C.I.S.I.R. Rainguards (Shell)	41	8.7	8.6	39.0	51.7
5.	4% Blidust Area with Single C.I.S.I.R. Rainguards (Latex Crepe)	41	1.0	0.4	0.0	3.0

Examination of Row Nos. 3 and 4 of Table No. 5 indicates quite clearly that the use of single rainguards on each tree of a block of about 1 acre in extent has not eliminated the risk of contamination. Presumably this is due either to faults in the design or in our application of the rainguards, or to neglect of the effect of wind-borne contamination. At present it is considered that the latter explanation is more probable although we are in fact testing the rainguards area with two rainguards per tree. On the assumption that wind-borne contamination is of importance we are also making arrangements to investigate the possibilities of plastic mackintosh type rainguards. The commercial suitability of such rainguards, even if successful in terms of reduction of contamination, may appear questionable; but it is understood that rainguards of this nature are undergoing small scale commercial trials in South India. In this connection it might be mentioned that recommendations to the effect that wherever possible cups should be inverted before dusting have already been issued and an appreciable number of estates arranged to have the shells inverted whenever the latex is not being collected. The desirability of the latter procedure is now being re-examined on Dartonfield and preliminary indications suggest that whenever possible cups should be either fully inverted or at least placed on their sides.

Row Nos. 1 and 2 of Table No. 5 have been included in the Table primarily as controls for the rainguards experiment referred to in Row Nos. 3 to 5. In fact both the former experimental areas bordered the rainguards area although one (Row No. 1) was undusted and the second was dusted with an organic dithiocarbamate fungicide which contained only nominal amounts of copper. A point of interest in connection with the data from these control areas is that there is some indication that for the purpose of separating scraps from dusted areas it would appear appropriate to include a significant number of boundary rows as dusted areas. The exact number to be included will no doubt depend upon the prevailing wind direction during (1) dusting, as this will largely control the area actually dusted, and during (2) periods (presumably mainly in showery conditions) when, in the absence of mackintosh type rainguards, rain and wind-borne contamination might occur. In the experiments summarized in Table No. 5, where the prevailing wind was probably mainly parallel to the direction of boundary rows with, usually, a slight inclination towards the plot described in Row No. 1 rather than that in Row No. 2, 2 to 3 square planting boundary rows would not appear to be sufficient.

6. Time and Method of Dusting :

In principle both of these subjects fall outside the normal terms of reference of the Chemistry Department, but considerable work has been done by the Department on both subjects. Data briefly summarized earlier clearly showed that in small scale dustings by the Plant Pathologist dusting dry leaves should not be encouraged, as the ratio of the amount of copper on wet to that on dry leaves varied from about 5 to nearly 30. In the period under review the Plant Pathologist and the Department have been asked to investigate the suitability of electrodusting in comparison with normal dusting. The basis of electrodusting is that, as leaves are stated to carry a predominantly negative charge, the application of a positive charge to the dust particles by means of an electrical device in the nozzle of the dusting machine might be expected, by virtue of the dissimilarity in electrical charge of the particles and the leaves, to increase the % of the dust retained by the leaves, and, by virtue of the similarity in electrical charge of the individual particles, to improve the coverage through a reduction in any tendency for the particles to agglomerate. It is understood that the literature on this subject does not give any valid *a priori* reason for presuming that electrodusting will be particularly helpful in the case of natural rubber, but nevertheless attempts have been made to obtain a preliminary indication

of whether electrodusting does in fact cause an increase in the copper retained on the surface of rubber leaves. In general the design of the experiments (except the first) and the analysis of the leaf samples have been the responsibility of the Chemistry Dept., and the operation of the electroduster and of a similar machine without an electrodusting attachment and the collection of the samples have been the responsibility of the Plant Pathologist. In all cases the dust used was Copper Sandoz 4%.

TABLE No. 6

Use of Electroduster. 1st Experiment 1957.

Clonal Area Used	Electrodusting Area Mean*	S. Devn.	Normal Dusting Area Mean	S. Devn.
GL.1 (7½ A)	.023	.008	.053	.050
PB 25 (7½ A)	.047	.009	.021	.006
Totals	.070		.074	

[*Copper in mgs on the 2 surfaces of pieces 2″ × 2″ taken from each of 5 leaves as a subsample, with 8 such subsamples averaged for the mean figure.]

In the first experiment (Table No. 6) the small branches removed for subsampling were not collected according to any preconceived system and it would appear from the numerical value of one of the standard deviations quoted that the copper to be found on the surface of leaves dusted normally can be very variable. A possible general practical implication of this comment is that unless the copper is spread relatively evenly both from leaf to leaf and within leaves by natural agencies (wind, rain, dew, etc.) a single dusting with only a limited amount of copper and possibly a long interval between rounds (during which time much of the original dust may be carried to the ground) may give neither a very good coverage nor, presumably, a very good control of the disease. In the context of these experiments the implication is that the method of tree sampling requires rather more care.

TABLE No. 7

Use of Electroduster. 2nd Experiment.

Selection of Leaf Sample from :	Electrodusting Area	Normal Dusting Area	Mean
1st Row from Path of M/c.	.48	.24	.36
3rd Row from Path of M/c.	.26	.13	.19
Mean*	.37	.19	

[*Average of weights of copper in mgs on the 2 surfaces of 5 leaf pieces each 2″ × 2″.]

In the second experiment (Table No. 7) there would appear to be an indication that electrodusting is of value and that there is more dust on the surface of leaves drawn from the first rather than the third row from the path of the dusting machines. If the latter comment has a sound statistical basis the practical implication is, presumably, that the path of the dusting machine should vary somewhat from round to round of dusting. In the third experiment (Table No. 8) sampled on the basis of 2 methods of dusting x 2 rows (distance from the path of the machines) x 2 locations on trees within rows x 2 samples per small branch selected at each location, there is a doubtful indication that electrodusting may be of value and a clearer indication that under the conditions used samples selected from near the top of the trees carry less copper than samples selected at lower levels. A provisional analysis of variance for the third test (*i.e.* of Table No. 8) can almost certainly be interpreted to indicate that electrodusting is not superior to normal dusting in this experiment—a result which is hardly surprising in view of the data summarized in the second row.

TABLE No. 8

Use of Electroduster, 3rd Experiment 1957.

Row No.	Selection of Leaf Samples from:	Electrodusting Area	Normal Dusting Area	Mean
1.	Near Tops of Trees	.041	.011	.026
2.	Near Bottom of Trees	.121	.122	.121
3.	Mean*	.081	.067	

[*Average of weights of copper in mgs on the 2 surfaces of 5 leaf pieces each 2″ × 2″.]

In the fourth experiment more care was taken in the field, where only a single dusting path was used and sampling was on the basis of 2 methods of dusting (electrodusting *v* normal dusting) × 3 rows (distances from the path of the machines) × 3 trees per row × 2 locations per tree (near the top and near the bottom), with provision for replicate sampling of leaves on the selected small branches removed to the laboratory for analysis. A provisional analysis of variance of the results summarized in Table No. 9 has been interpreted to indicate that the difference in favour of electrodusting is not significant.

TABLE No. 9

Use of Electroduster. 4th Experiment 1957.

Selection of Samples from:	Electrodusting Area	Normal Dusting Area	Mean
Row No. 1	.701	.584	.642
Row No. 2	.030	.056	.042
Row No. 3	.011	.033	.022
Mean*	.247	.224	

[*Average of weights of copper in mgs on the 2 surfaces of 5 leaf pieces each 2″ × 2″.]

As a summary, it seems reasonable to suggest that our attempts to show that electrodusting 'puts more copper on the leaves' have proved a failure. This does not necessarily imply that the same conclusions would be obtained with finer and, presumably, more expensive dusts, nor does it mean that electrodusting is necessarily useless in the field as it might, through a reduction in agglomeration of the particles, give a more even cover. It is anticipated that the Plant Pathologist will use electrodusters in the field in 1958.

7. Interval between Dusting and Tapping:

We have suggested previously that in order to minimize contamination, dusting and tapping should not be allowed to take place on the same day in one area and it is therefore of interest to note that 62.5% of the limited number of processed panel and shell scrap samples, collected from the Dartonfield small scale experiments when dusting and tapping took place on the same day, contained samples of rubber with at least 7.9 p.p.m. of copper. Most but not all of the samples refer to dusting with (Cuprosana R6 or) Blidust 4% and did not in general involve inversion of the shell. While the volume of the data involved is strictly limited it is clear that dusting (and probably indirect dusting, *e.g.* by drifting of the dust) should not as far as possible take place shortly before tapping.

TABLE No. 10

Relative Significance of the Interval between Dusting and Tapping, for Processed Scrap Crepes.

No. of the Tapping (d/2) after Dusting	1st	2nd	3rd	4th	5th	Others
Of all samples with Cu 7.9 p.p.m., % collected on this day is	44	16	15	9	6	10

As we propose for the 1958 phytophthora season that scraps from dusted areas shall be set aside for controlled blending and testing, etc., it is necessary to give some guidance on the period for which this separation should continue after the last dusting. The information summarized in Table No. 10 refers mainly to 4% and 6% dusts and indicates that although the probability of contamination is highest at the first tapping after dusting, *i.e.* usually the first or second day after dusting, contamination can also occur to an appreciable extent at many subsequent tappings. The figure of 10% under "Others" refers mainly to the use of a dust containing a wetting agent. On the basis of this table we would suggest that separation of scraps from dusted areas should continue upto and including at least the fourth tapping after dusting. The picture obtained from Table No. 10 might cease to apply in the case of dusts containing relatively high proportions of copper with an effective sticker, but upto the present such dusts are not recommended and the information at present available with 1% dusts containing a sticker suggests (Row No. 4 of Table No. 3) that the risks of contamination might not be unduly high.

8. The Removal of Copper from Scraps :

We have indicated earlier that over 9% of all the processed scrap samples examined upto near the end of 1956 contained portions of rubber with at least 7.9 p.p.m. of copper. At that time and earlier it was presumed that one suitable method of reducing both the extent and seriousness of contamination of scrap crepes might be to add to the scrap soaking tanks a chemical which would remove much of the copper. Procedures of this nature have been employed elsewhere for removing residual fungicides from fruits, but in the case in mind here there are two additional difficulties; firstly, there is no valid evidence to suggest that the copper is wholly on the surface of the scraps and in fact it is more reasonable to presume that an appreciable part will be quite firmly occluded inside the partially dry scraps, and secondly as the process in mind involved using all scraps from the dusted areas the weight of chemical which could be used per 100 lb. d.r.c. of scraps would have to be limited on cost grounds. Solubilisation of copper occluded in scraps under these conditions is likely to be very slow and it is, therefore, hardly surprising to find that, although our soaking treatments were sometimes continued for several days (and in fact probably beyond the limit imposed by the size of the average estates' scrap soaking tanks), the results in terms of the % of added copper removed in comparison with that removed by the normal estate's process were neither very attractive nor very reproducible.

As our suggestions for the 1958 season involve further chemical or other treatment of only those batches where in effect either or both of the average and the standard deviation of the copper content is high, it would probably be practicable to permit a substantial increase in the quantity of chemical which can be employed, provided, of course, that there is no appreciable adverse effect on other technological properties. Preliminary tests, at present mainly with latex coagulum and various salts of E.D.T.A. and a chemical known under the trade name of polychelate, have indicated that control samples with 20 and 40 p.p.m. of copper can, under the appropriate conditions, be reduced to 3 to 5 p.p.m. using the normal analytical procedures for testing. Whether an equally effective and suitable process can be evolved for scrap blanket is not yet known. In the event that a scrap blanket soaking process suitable for the partial or complete decontamination of blends retained for further treatment is not available, it will be clear that the mean and standard deviation of the copper content of each retained blend will have to be utilised to decide whether the blend should be rejected outright and burnt or whether special remilling and reblending alone or with scrap from undusted areas is likely to be successful.

9. Copper in Treseal :

It is known that certain clones, *e.g.* MK 3/2, are particularly susceptible to extensive bark rots of the tapping panel due to phytophthora palmivora, and it is therefore hardly that a very limited number of trees have, after excising the diseased portion of the tree, tried the effect of small portions of conventional copper dusts crudely mixed into a waterproof such as Treseal compound. The proportion of copper in the compound applied to the tree has been about 1.2% and it would appear that in spite of predictions (with which we did not agree) that the treatment should not be effective, it has in fact given satisfaction. Obviously if the copper in the waterproof is 'available', through surface and partition mechanisms, for fungicidal activity on the tree it might also be 'available' for washing down into latex and onto scrap. Where the treated area of the tree is on the reverse side to the panel in use, the risk of contamination will presumably be quite small; but the position when the treated area is vertically above a panel in tapping is not yet clear. Estates

wishing to use conventional copper dusts in a waterproof on old diseased areas above a panel in tapping are invited to write to the R.R.I.C. for the latest information on fungicides, *e.g.* Kankerdood, etc.

It is also understood that one of the above mentioned estates wishes to use Treseal containing copper as a fungicidal waterproof to be applied at fairly regular intervals just above the panels of particularly susceptible clones. Small scale tests at Dartonfield designed to indicate the extent and seriousness of contamination are in progress and, pending their completion, we do not feel inclined to recommend the extension of the use of this fungicidal waterproof on the panel to other areas or estates. Preliminary data suggests that one serious danger will be dripping of the waterproof onto the scraps at the time of application when copper contents of panel scrap crepes of about 200 p.p.m. have been recorded. On several occasions information on alternative fungicides may be obtained by reference to R.R.I.C.

10. Procedures Recommended for 1958 to Minimize Contamination due to Copper.

The more important suggestions and comments are given below in tabular form on the presumption that as far as possible scraps will not be rejected.

Subject, etc.		Procedure and Comments, etc.
1. Dusts to be Used :	1.1	Conventional 4% and 6% dusts to be used without a sticker or approved 1% dusts with a sticker, *e.g.* Ciba 1%, (with a preference for the latter).
	1.2	Dusts containing a wetting agent should probably not be used, but this is by no means certain.
	1.3	Dusts containing more than 6% of Copper should only be used after reference to R.R.I.C.
	1.4	Dusts with unapproved particle size distributions should not be employed without reference to R.R.I.C.
2. Rate of Application :	2.1	Follow the suggestions of the Plant Pathologist, R.R.I.C. (Leaflet No. PP/58/1).
	2.2	If heavier applications are required, kindly advise R.R.I.C.
3. Method and Time of Dusting Testing Machine	3.1	Follow the suggestions of the Plant Pathologist, R.R.I.C.
	3.2	Do not test dusting machines containing any copper dusts in or near the factory, or in or near an area where tapping is, or will shortly be, in progress, or in or near an area through which tappers buckets or scraps are being, or will shortly be, carried uncovered.

3.3 When areas near the factory have to be dusted, shut the factory and loft windows and protect all rubber in or near the factory, *i.e.* dripping R.S.S., latex, coagulum, finished material, etc., from drifting dusts. If there is any doubt about the practicability of this it might be better not to dust near the factory.

3.4 Machines in operation with copper dusts should not stand stationary or nearly stationary in mature rubber. Thus if spot dusting is in fact necessary, do not allow a few trees near the machine to be 'drenched' in copper dust, and where movement round a particularly rocky area slow down the rate of progress cut down the feeding or dust exit rate in a similar proportion.

3.5 Do not dust and tap any areas on the same day.

4. Shells :

4.1 Shells should be completely inverted before dusting and if possible,

4.2 Shell should be kept inverted whenever a tapping is not actually in progress.

5. Scraps :

5.1 Scraps drawn from all dusted areas should be kept separate in the field and factory from scraps drawn from undusted areas.

5.2 If practicable, scraps drawn from 4-5 boundary rows should also be included as scraps from dusted areas.

5.3 Panel and shell scraps from dusted and boundary areas may and should be mixed together.

5.4 Selection of scraps from dusted areas as in 5.1 and 5.2 should continue for not less than 4 tapping days after the final cessation of dusting.

6. Latex (Normal Tapping):

6.1 In the absence of partial washouts latex drawn from dusted areas must be bulked and well mixed with *as much latex as possible* from undusted areas.

6.2 Where the dilution envisaged in 6.1 is not practicable due to insufficient latex, or to precoagulation or crepe colour difficulties, the R.R.I.C. should be informed with a

view to advising on the procedure to be employed for selecting test samples and for blending, etc.

7. Partial Washouts :

7.1 If the latex from dusted areas is collected before any dilution takes place, the latex can be treated as usual (6.1, 6.2).

7.2 But if there is doubt about the absence of dilution or if the storm or shower is heavy and wind-borne contamination occurs, (*i.e.* if dust from the leaves or trunks is being blown into the shell), the latex should be treated as in 7.3.

7.3 Latex from dusted areas which may have been diluted by rain or by wind-borne contamination, as envisaged in 7.2, should be well mixed together and then coagulated separately. If the final product is R.S.S. the milled coagulum should be marked with, say, two or three triangular notches and the dried R.S.S. retained pending examination by R.R.I.C. after random sampling. If the final product is crepe, it would be simplest in terms of volume of sampling if no fraction is taken. The final dry laces should be blended before blanketing, and sampled and tested before despatch.

7.4 Precoagulum from partial washout latex should be set aside in the final dry lace form for blending before blanketing, and for sampling and testing before despatch.

8. General :

8.1 The areas to be dusted should be restricted as far as possible.

8.2 Managers and Superintendents are requested to ensure that their field and factory staffs, onto whom falls the responsibility for the success or failure of any scheme which does not involve extensive rejection of valuable final products, are made familiar with the procedures required.

8.3 Details of the blending of scraps before processing, the blending of scrap laces before blanketing, the procedures for blanketing, and of the methods of sampling prior to despatch will probably be circulated or explained later.

II. Summary :

The data collected on this subject in 1957 and in previous years have been reviewed at considerable length with the object of clarifying certain misconceptions and of emphasizing certain points of interest to the practical Planter. The possibility of controlled blending of scraps supplemented by an elaborate system of analysis is discussed in some detail, and it is emphasized that such systems may well be unsatisfactory if there is insufficient care in the field and factory. Information presented on the relative extent of contamination of processed scraps drawn from smallscale dusting experiments suggests that an approved 1% copper dust with a sticker may be most suitable. Further attention has been given to the subject of rainguards, without obtaining much useful information. Several experiments, with the Plant Pathologist, to assess certain aspects of the use of electrodusting as opposed to normal dusting do not clearly suggest that the former procedure is of much value under the conditions employed. A list of suggested precautions for the 1958 season is included.

Note by Author.—This contribution to this Journal is based upon Information Leaflet No. C/58/1 which was circulated at the end of January 1958 primarily to Agency Houses and to various estates which have assisted the Institute in the matter of supplying relevant samples or of allowing certain tests to be made on these estates. Grateful acknowledgement is made to the Proprietors, Agents and Resident Managers, Superintendents of these estates, and to Messrs. T. S. Nathan and M. T. Veerabangsa and their juniors within the Chemistry Dept. of the R.R.I.C. who have carried out the major portion of the programme summarized in this article.

PLANTING TOPICS AND QUESTION CORNER

A Simple Means of Improving Latex Quality

On some Estates it is standard practice to replace the latex collection cups (coconut shells) on the cup hanger in an upright position after collection of the latex.

This practice allows wind-borne dust, rain water washing down the tree trunk and, in the case of copper-dusted areas, fungicide to collect in the shells thus resulting in heavy bacterial infection and in copper contamination of the latex.

It would, therefore, be beneficial on all counts if the shells when not in use be kept in an inverted position. This can easily be done by placing the shell upside down on a stick driven into the ground alongside the tree.

This simple procedure would be expected to result in an improvement in latex quality.

E.D.C.B.

Waterproof Dressings not a Cure for Bark Rot

There would seem to be some confusion about the part played by waterproof dressings in the treatment of bark rot of rubber trees.

Waterproof dressings are mainly neutral grease products with no, or very little, fungicidal properties. They perform merely a mechanical function which is to prevent the water-miscible fungicide applied to the bark from being washed off by rain water and they have no direct influence on the control of bark rot.

It is a fairly common occurrence in wet weather for bark rot to develop on tapping panels which have been treated only with a waterproof dressing and not, as recommended in our Advisory Circular No. 54, *in addition to* a water-miscible fungicide, such as Brunolinum plantarium.

Serious damage has been caused on some estates to the tapping panel of well grown, high yielding budded trees by ill advised application of waterproof dressings to wet bark harbouring spores of Phytophthora palmivora without first applying a water-miscible fungicide.

This practice is strongly deprecated and waterproof dressings should be applied only to *dry* bark and *after* an application of a water-miscible fungicide.

E.D.C.B.

QUESTION CORNER

Question.

Would you recommend pinching off the terminal bud of 1 to 1½ years old buddings of clone PB 86 in order to provide a better balanced tree and to accelerate girthing?

Answer.

Definitely not ! Only a few very late branching clones, as for example LCB 1320, may require this type of artificial inducement to promote branching at a height of, say, 9 to 10 feet.

Clone PB 86 does *not* require this treatment.

We welcome this question as we had occasion recently to inspect a replanting of clone PB 86 in which thumb-nail pruning of the terminal bud had been carried out at a height of about 5 feet from the ground when the plants were just over a year old.

Branching, in some cases , had occurred at a height of not more than 4 feet from the ground but most plants had branched at a height of about 5 feet.

A common type of branching seen in this field consisted of two branches resulting in a Y shaped tree. A weak crotch had formed at the junction of the two branches and several cases were seen where one branch had come clean off or had caused a split of the short trunk when it came away at the crotch.

Another common type of branching seen consisted of 3 to 5 branches all arising from the same level on the stem. Very few cases of wind breakage were noticed in this type of branching but the presence of Swedish Red at the branch junctions of many trees was indicative of Phytophthora infection.

The low branching artificially induced would preclude any form of high tapping of these trees in later years and would create damp conditions in the immediate vicinity of the tapping panel thus increasing the incidence of bark rot, especially as the type of multiple branching is expected to result in a high incidence of stem canker at the branch junctions, and to provide the Phytophthora spores which, when washed down by rain, would bring about infection of the tapping panel.

In this particular case the disadvantages have far outweighed any hoped for advantages such as increased wind resistance in exposed situations and an increased rate of girthing in the early years.

E.D.C.B.

RUBBER RESEARCH INSTITUTE OF CEYLON

Minutes of the 153rd meeting of the Rubber Research Board held in the Board Room of the Tea Controller's Office, Eastern Bank Building, Fort, Colombo, at 2-30 p.m. on Monday, 18th November, 1957.

Present:—Mr. S. Pathmanathan (in the Chair), Senator Thomas Amarasuriya O.B.E., Mr. H. St. J. Cole-Bowen, Dr. M. F. Chandraratne (Director of Agriculture), Mr. W. P. H. Dias J.P., Mr. G. H. Dulling, Mr. Errol A. Jayawickrema J.P. U.M., Mr. V. T. G. Karunaratne M.P., Mr. B. Mahadeva (Rubber Controller), Mr. H. E. Peries (Deputy Secretary to the Treasury), Mr. C. A. de Silva (Acting Director) and Mr. C. D. de Fonseka (Administrative Secretary).

1. Minutes:

(*a*) *Confirmation*—Draft minutes of the meeting held on 12th September, 1957, which had been circulated to members, were signed by the Chairman.

(*b*) *Matters arising from the minutes:*

(*i*) **Investments.**—The Chairman reported that part proceeds of State Mortgage Bank debentures compulsorily redeemed had been invested in Sri Lanka Government 3% Loan 1969/74. This was approved.

(*ii*) **Smallholdings Department's Appointments Committee.**—It was agreed that Mr. B. Mahadeva (Rubber Controller) be included in this Committee.

(*iii*) **Director.**—It was reported that Dr. E. D. C. Baptiste had left London on 31st October and that his tour in America would take longer than previously anticipated. He was expected to return to London on 18th December.

2. Administrative Committee:

The recommendations made by the Administrative Committee at its meeting of 28th October were approved subject to the following comments:—

(*a*) *Agronomist.*—A letter received from Mr. D. H. Constable, Agronomist, subsequent to the Committee meeting stating that he would not accept re-engagement on the termination of his present contract was read. The resignation was accepted with regret.

(*b*) *Works Inspector.*—It was agreed that instead of a Clerk of Works, a Works Inspector be appointed after advertisement in the daily press.

(*c*) *Clones of RRIM 500 series.*—It was reported that the Rubber Research Institute of Malaya had agreed to release clones of the RRIM 500 series for re-sale without restrictions within Ceylon provided that similar reciprocal facilities are allowed in respect of the distribution of certain Ceylon clones within Malaya.

(*d*) *Advertisements in Quarterly Circulars.*—It was agreed that the charges for advertising in the Quarterly Circular be increased to Rs. 35/- per full page and Rs. 22/50 per half page.

3. Salaries Committee :

The recommendations made at the meeting held on 14-11-57 were approved. These recommendations concerned certain alterations in the salary scales and terms of recruitment of new entrants.

The following recommendations made by the Committee, in response to requests made by the R.R.I.C. Employees' Union, were also approved:

1. *Housing Loans.*—Allow same concessions as to Government servants, *i.e.* give loans not exceeding two years' salary for the purchase of land for construction of a house and request officers to apply to the Housing Loans Department for loans to build houses.

2. *Rent Allowance.*—Allow same rates of rent allowance as for Government servants.

3. *Train fare.*—Allow same concessions as provided for Government servants regarding daily train travel to office and back. This will apply only to officers working in the Smallholdings Department's office at Colombo.

In regard to certain specific requests for improvement of salary, the Board endorsed the Committee's view that, in keeping with Government practice, it is opposed to the grant of increments to members of the staff on a personal basis.

The Chairman tabled the report of the Organisation and Methods Division of the Treasury on the general organisation and conditions of service of the staff. The Board expressed its thanks to the Deputy Secretary to the Treasury, the Director of the Organisation and Methods Division and Mr. A. B. Samarajeewa for the valuable assistance rendered by them in this connection.

4. Reports and Accounts :

Receipts & Payments Account for the 3rd Quarter 1957.—was approved.

The meeting terminated at 4-30. p.m.

RUBBER RESEARCH INSTITUTE OF CEYLON

Draft Minutes of the 154th meeting of the Rubber Research Board held in the Rubber Controller's Office, Eastern Bank Building, Fort, Colombo, at 2-30 p.m. on Friday, 7th February, 1958.

Present.—Mr. S. Pathmanathan (in the Chair), Dr. M. F. Chandraratne (Director of Agriculture), Mr. W. P. H. Dias J.P., Mr. L. C. de Mel, Mr. G. H. Dulling, Mr. V. T. G. Karunaratne M.P., Mr. H. E. Peries (Deputy Secretary to the Treasury), Mr. C. A. de Silva (Acting Director) and Mr. C. D. de Fonseka (Administrative Secretary).

1. Board :

(*a*) **Late Mr. T. E. H. O'Brien ex Director.**—A vote of condolence was passed on the death of Mr. T. E. H. O' Brien who had served the Institute for a period of 25 years, first as Chemist and then as Director. He was the Institute's first Director and great credit was due to him for having guided the work of the Institute during the early years.

(*b*) **Changes in Membership.**—The following changes in membership were reported.

1. Mr. H. St. J. Cole-Bowen would be away from Ceylon for 6 weeks from the 1st January to 15th February.

2. Mr. G. H. Dulling had been re-nominated by the Planters' Association of Ceylon for a further period of 3 years with effect from 15th February, 1958.

3. Mr. S. Pathmanathan had been re-nominated by the Low-Country Products Association of Ceylon for a further period of 3 years with effect from 21st January, 1958.

4. Mr. L. C. de Mel had been nominated to represent the Low Country Products Association with effect from 21st January, 1958, in place of Mr. Errol A. Jayawickrema J.P. U.M.

5. Mr. W. P. H. Dias J.P. had been re-nominated by the Hon'ble Minister of Agriculture and Food to represent the smallholders for a further period of 3 years with effect from 1st February, 1958.

Mr. L. C. de Mel was welcomed to the Board and Mr. Jayawickrema was thanked for his services during his period of membership.

2. Minutes :

(*a*) *Confirmation*—Draft minutes of the meeting held on 18th November, 1957, which had been circulated to members, were signed by the Chairman subject to a minor amendment.

(*b*) *Matters arising from the Minutes—Insurance*—It was reported that the Fire Insurance Policies covering the laboratories, factory & bungalows and the Cash-in-Transit and Rubber-in-Transit Policies of the Institute had been transferred to the Co-operative Wholesale Establishment (Insurance Department).

3. Administrative Committee :

The recommendations made by the Administrative Committee at its meeting of 20th January, '58 were approved subject to the following comments:

(*a*) *Staff.*—It was agreed that as soon as the Asst. Superintendent's bungalow is ready for occupation the post of Assistant Superintendent should be advertised.

The Visiting Agent's suggestion that steps should be taken to train tappers for employment at Hedigalla was approved.

(*b*) *Additional Engine for Nivitigalakele.*—The recommendation that an additional engine for Nivitigalakele be purchased was approved and a supplementary vote was passed for this purpose.

(*c*) *Plant Breeder.*—As recommended by the Committee, it was agreed that the assignment of Mr. Wallace E. Manis as Plant Breeder for a period of 2 years be accepted. The assignment had been made by the United States Operations Mission in consultation with the Ceylon Government.

(*d*) *Director's visit to Liberia.*—The Chairman reported that, as authorised by the Administrative Committee, he had sent a cablegram to Dr. Baptiste conveying approval of his visit to the Firestone Rubber Plantation Co's estates in Liberia on his way back from U. K.

(*e*) *Supplementary votes.*—Supplementary votes were passed, as recommended by the Committee, for the following:

Purchase of 5 fire extinguishers
Purchase of new factory weighing machine and 3 counter scales.
Alteration to Director's bungalow.

(*f*) *Membership of the Committee.*—On the proposal of the Chairman, Messrs. L. C. de Mel and V. T. G. Karunaratne M.P. were nominated to serve on the Committee in addition to the present members.

4. Salaries Committee :

The recommendations made at the meeting held on 20th January, were approved. It was noted that in the opinion of the Treasury representative who had examined the salary scales of all grades of Minor Staff these are adequate and reasonable in comparison with Government scales except in the case of motor lorry drivers; this scale was then improved.

5. Smallholdings Committee :

The recommendations made by the Committee at its meeting held on 20th December, 1957, were approved subject to the following comments:

(*a*) *Smallholdings Sulphur Dusting Scheme.*—The recommendation that the Hon'ble Minister of Agriculture & Food be invited to inaugurate the Smallholdings Sulphur Dusting Scheme for 1958 was approved, and it was noted that arrangements had been made for the inauguration at 8-30 a.m. on 11th February at Kaluaggala, Kosgama.

(*b*) *Visits to Smallholdings.*—Mr. W. P. H. Dias expressed a wish to visit smallholdings and inspect the work in Rubber Instructors' ranges. This was agreed to.

6. Reports and Accounts :

(*a*) *Auditor General's Report for* 1956.—The report was adopted and covering sanction was granted for over-expenditure on certain revenue and capital items. Balances of seven capital votes amounting to Rs. 94,229/- were revoted for 1957.

(*b*) *Investments.*—It was reported that a sum of Rs. 48,700/- had been invested in Ceylon Govt. 3¼% Loan 1973/77.

7. Staff :

(*a*) *Agronomist.*—It was reported that Mr. D. H. Constable, Agronomist, had left Ceylon on 14th December, 1957, on the termination of his contract.

(*b*) *Asst. & Minor Staff Changes.*—Changes in staff since the last meeting were reported and approved.

8. Amendment to Rubber Research Ordinance :

Rubber Research (Amendment) Act. No. 52 of 1957 which provides for an increase of the Rubber Research Cess to thirty-three-fortieth of a cent on every pound of rubber exported from Ceylon, with effect from 1st January, 1958, was tabled.

9. Publications.—The following publications were tabled:—

(*a*) Combined 1st & 2nd Quarterly Circulars for 1957.

(*b*) Smallholdings Folder No. 4/A—Sulphur Dusting of Smallholdings 1957/58 (both in English and Sinhalese).

10. Next Meeting.—It was decided that the next meeting of the Board be held in Colombo on Friday, 28th March, 1958.

The meeting then terminated.

RUBBER RESEARCH INSTITUTE OF CEYLON

Minutes of the 155th meeting of the Rubber Research Board held at 2. p.m. on Friday, 28th March 1958, in the Rubber Control Board Room, Eastern Bank Building, Fort, Colombo.

Present.—Mr. S. Pathmanathan (in the Chair), Senator Thomas Amarasuriya O.B.E., Mr. G. H. Carter, Mr. W. P. H. Dias J.P., Mr. L. C. de Mel, Mr.G.H. Dulling, Mr. V. T. G. Karunaratne M.P. Mr. B. Mahadeva (Rubber Controller), Mr. H. E. Peries (Deputy Secretary to the Treasury), Dr. E. D. C. Baptiste (Director) and Mr. C. D. de Fonseka (Administrative Secretary).

Dr. M. F. Chandraratne, Director of Agriculture, had indicated his inability to attend.

1. Minutes :

(*a*) *Confirmation.*—Draft minutes of the meeting held on 7th February, 1958, which had been circulated to members, were signed by the Chairman.

(*b*) *Matters arising from the minutes:—*

Training of a Representative from the Philippines Bureau of Plant Industry.—Agreed that arrangements be made for assisting in a programme of observation and training of a representative of the Philippines Bureau of Plant Industry for a period of 2 months at Dartonfield.

2. Administrative Committee :

The recommendations made by the Administrative Committee at its meeting of 20th January 1958 were approved subject to the following comments:

(*a*) *Director's Visits.*—The Director gave an account of his visits to research stations in Central and South America and thanked the U.S. International Co-operation Administration (I.C.A.) which had drawn up his program of visits and given him considerable assistance at all the places visited by him.

The arrangements made by the Director regarding (a) the establishment of a large scale testing station at Turrialba for all participating rubber growing countries, and (b) exchange of clones with the Instituto Agronomico do Norte, Brazil, and Firestone Plantations Ltd., Liberia, were approved.

(*b*) *Chemist—Renewal of Contract.*—As recommended by the Sub-Committee appointed to consider this matter, it was agreed that Dr. Risdon be offered re-engagement for a period of two years followed by 4 months' leave.

(*c*) *Plant Breeder.*—The arrangements made for the new Plant Breeder, Mr. Wallace E. Manis, to spend about 2 weeks at Belterra in Brazil before his arrival in Ceylon were noted. The Director reported that these arrangements had received the approval of the I.C.A., Washington.

(*d*) *Agronomist.*—The recommendation that this post should be designated Soils Chemist was approved and it was agreed that the post be advertised locally and abroad.

(*e*) *Research Assistant, Botany Dept.*—In view of the Committee's recommendation, it was agreed that Mr. L. B. Chandrasekera, Research Assistant, Botany Dept., be asked to return to Ceylon at the end of his present course of studies at Cambridge University for the Diploma in Agricultural Science.

The Director stated that it would be useful if Mr. Chandrasekera could spend a few weeks at Rothamsted, Long Ashton, East Malling and John Innes research stations after the completion of his course at Cambridge in June 1958. This was approved.

(*f*) *Visit of Dr. Harlan L. Trumbull.*—As recommended by the Committee, it was agreed that Dr. Harlan L. Trumbull, formerly Manager of Rubber Research, B.F. Goodrich Research Centre, Brecksville, Ohio, U.S.A. and Director of Research and Development, Office of Rubber Reserve, United States Government, be entertained to lunch by the Board on 2nd April and it was noted that he would give a talk on "Development and Use of Synthetic Rubber in U.S.A.", at the Ceylon Chamber of Commerce on the same day.

(*g*) *Assistant Superintendent.*—The recommendations made by the Sub-Committee which considered the applications for the post of Estate Superintendent were noted and it was agreed that Mr D. de S. de Fonseka be appointed to the post.

3. Purchase of Sub-station :

A sub-committee was appointed to consider the purchase of a suitable sub-station in the Sabaragamuwa area during the current year.

4. Reports and Accounts :

(*a*) *Chairman's and Director's Reports for* 1957.—These were approved subject to two minor amendments.

(*b*) *Balance Sheet and End-of-Year Accounts for* 1957.—These were considered and approved.

(*c*) *Receipts and Payments Account for the 4th Quarter* 1957.—were approved.

(*d*) *Investments.*—It was reported that a sum of Rs. 400,000/- had been placed on fixed deposit with the Eastern Bank, Colombo, at 2¼% per annum for a period of 3 months with effect from 26th February 1958.

5. Staff :

Changes.—Changes in staff since the last meeting were reported and approved.

6. Publications :

The following roneoed Leaflets were tabled:

Advisory Leaflet No. PP/58/1—Notes for the Phytophthora Season 1958.

Information Leaflet No. C/58/1—Further Comments on the Contamination of Natural Rubber by Fungicidal Dusts Containing Copper.

The meeting then terminated.

Printed for the RUBBER RESEARCH INSTITUTE OF CEYLON, *Dartonfield, Agalawatta, by* H. W. CAVE & CO., LTD., *Fort, Colombo.*

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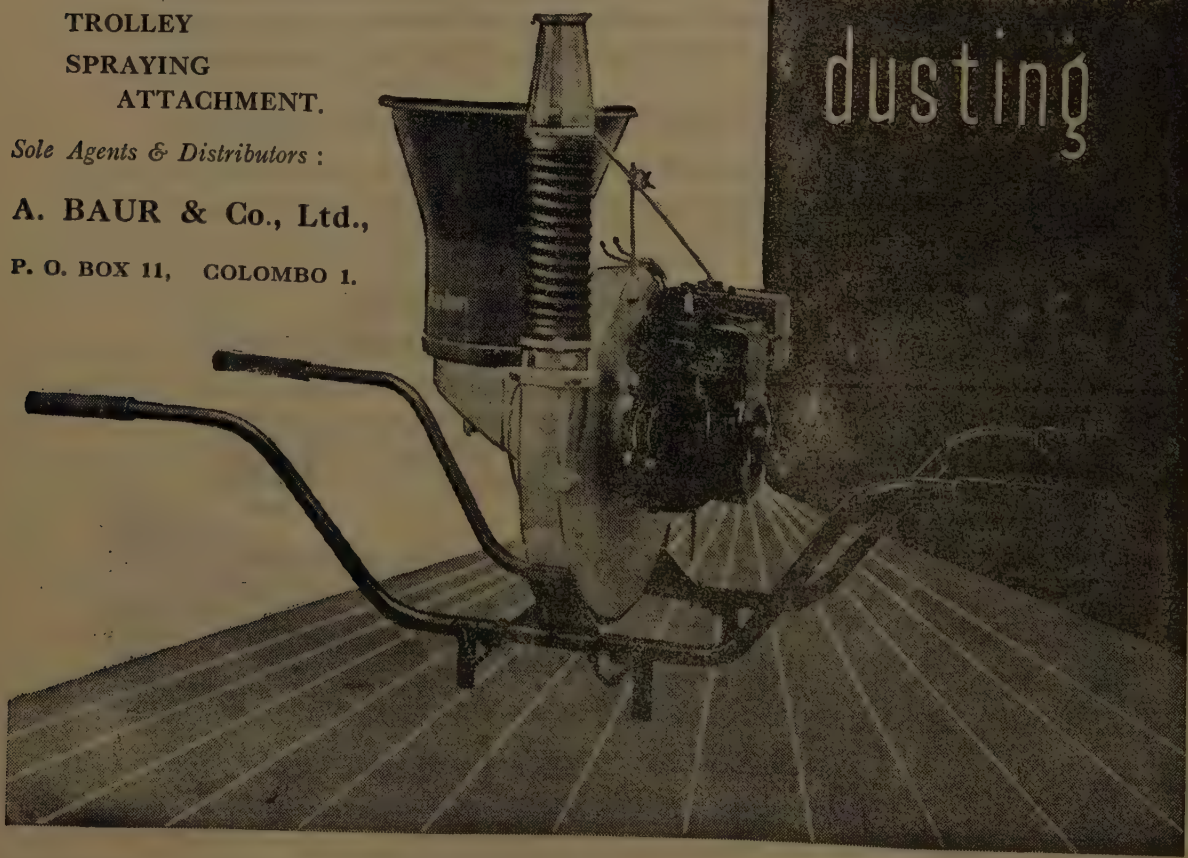

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RUBBER RESEARCH INSTITUTE OF CEYLON

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Note.—The Laboratories and Head Quarters Offices of the Institute are situated at Dartonfield Estate, Agalawatta, Telephone No. 26, Agalawatta, Telegraphic Address 'Rubrs' Agalawatta. There are two Experimental Stations, one at Nivitigalakele, Matugama, and the other at Hedigalla, Latpandura. The Office of the Smallholdings Department is at No. 33, Clifford Place, Colombo 4. Telephone No. 84205, Colombo.

All enquiries and other communications should be addressed to the Director, Rubber Research Institute of Ceylon, Agalawatta.